Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	)	
	)	
Revision of Part 15 of the Commission's	)	ET Docket No. 98-153
Rules Regarding Ultra-Wideband	)	
Transmission Systems	)	

REPLY COMMENTS ON NTIA NON-GPS COMPATIBILITY STUDY

Fantasma Networks, Inc. ("Fantasma") hereby replies to the comments filed on the Non-GPS compatibility study (the "Non-GPS Study") prepared by the National Telecommunications & Information Administration ("NTIA").

INTRODUCTION

The comments on the Non-GPS Study largely are in agreement in one respect: virtually all of the parties agree that NTIA's extreme-case test criteria used to predict the interaction of ultra-wideband (UWB) technologies with other systems did not reflect real-world operating conditions. Several parties argued that resulting uncertainties warrant further delays in authorizing UWB while additional studies are completed.[1] Others misinterpreted some apparent findings of the Non-GPS Study and argued that the FCC should authorize UWB only above approximately 3.1 GHz.

Advocates and developers of UWB communications systems, including Fantasma, noted that the "cumulative progression of worst case assumptions in the Non-GPS Study" resulted in overstatement of the likelihood that UWB

[1] See, e.g., Comments of ARINC and the Air Transport Association of America, Inc. ("ARINC"); Comments of AT&T Wireless Services, Inc. ("AT&T Wireless"); Comments of Lockheed Martin Corporation ("Lockheed Martin"); Comments of Sirius Satellite Radio Inc. ("Sirius").

communications will cause harmful interference to other spectrum users.[2] If the Non-GPS Study had, in fact, examined users between 2.0 GHz and 2.7 GHz in realistic spectrum environments, the results would likely have supported the FCC's judgment that UWB communications are just as compatible above 2.0 GHz as the NTIA found them to be above 3.1 GHz. The Commission should therefore promptly authorize UWB communications technologies above 2.0 GHz.

DISCUSSION

I. NTIA's Worst-Case Assumptions Resulted In An Overstated Threat of Harmful UWB Interference.

As Fantasma noted in its comments, NTIA's decision to take an extremely cautious approach in its UWB compatibility analysis was fitting and appropriate under the circumstances. As a result of that caution, however, NTIA failed to consider a wide range of technical and operational factors that will in practice mitigate the threat of harmful interference from UWB communications applications.

Fantasma described these mitigating factors in its comments and quantified their possible effects on interference.[3] These factors included:

- 20 dB limit on transmitter peak-to-average ratio.
- Predominately indoor operation, particularly at 30 meters or higher, with associated signal attenuation.
- Realistic propagation models.

When these mitigation factors and other operational factors are taken into account, the real-world compatibility of UWB technologies is significantly higher than suggested in the Non-GPS Study. Indeed, the Non-GPS study provides a

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[2] Fantasma Comments at 1-2. See also, e.g., Comments of Time Domain; Comments of 3Com Corporation ("3Com").

[3] See Fantasma Comments at 4-11.

strong basis for quickly authorizing, rather than unnecessarily restricting, low power UWB communications.

A. UWB Communications Pose No Significant Threat Of Interference To Wireless Systems, Including "3G" Systems.

Sprint Corporation, AT&T Wireless, and Cingular Wireless LLC each urged the Commission to delay deployment of UWB to protect consumer wireless systems • fixed and mobile • present and future • and particularly so-called "3G" wireless systems that have yet to be authorized or defined. The concerns, however, are overstated.

For UWB, a major characteristic allowing frequency-sharing compatibility is the transmitter's spreading of a very low emitted power over many GHz of bandwidth. UWB power density within any conventional communications channel thus approaches the undetectable except when using receivers designed specifically for detecting UWB signals. By operating at very lowpower, UWB communications devices will function only over relatively short distances – a factor that substantially limits the ability of UWB devices to cause harmful interference.

Building on the NTIA Non-GPS Study, Fantasma, and others have demonstrated through a variety of technical arguments that UWB does not pose a credible threat of harmful interference to numerous existing radio systems above 2.0 GHz. These same technical factors will apply just as appropriately when considering potential harmful interference to 3G systems. In fact, when 3G eventually is deployed, it will be a modern, scalable, and robust system that may well be far *less* susceptible to harmful interference than similar, existing networks. Accordingly, 3G wireless systems will be no more susceptible to harmful interference than existing radio systems already examined in the Non-GPS Study.

B. Licensing Of UWB Communications Is Neither Practical Nor Necessary

(1) Licensing would be an unnecessary and intrusive requirement.

In its comments, Cingular asserted that licensing UWB devices is essential to prevent uncontrollable interference and that the first wave of UWB applications will be "ground and wall penetrating radars to be used mostly by professionals."[4] On the contrary, UWB communications applications will revolutionize communications precisely because they will be available to all consumers. Only unlicensed operation under Part 15 can provide the necessary widespread, transparent deployment of such wireless devices. Requiring such applications to be licensed would be tantamount to smothering UWB at the moment of birth, while being of little or no value.

(2) Unlicensed low power UWB will not impinge upon the rights of licensees.

The Commission can discount Sprint's hyperbole, which suggests that allowing UWB technologies to operate pursuant to Part 15 would somehow "convert exclusive PCS licenses into non-exclusive licenses."[5] In fact, PCS and other licensees would remain primary within their authorized bands. The harmful interference protection that they enjoy in those bands, however, does not in any sense limit the Commission's authority to allow others to use the spectrum on a secondary, non-interference basis.[6]

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[4] Cingular Comments at 2.
[5] Sprint Comments at 9.
[6] The Commission long has allowed secondary users, including Part 15 operations, to use spectrum licensed on a primary basis for other services. See, e.g., Amendment to Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, 10 FCC Rcd 4695, 4704 (1995) (Part 15 secondary to licensed LMS systems in the 902-928 MHz band); Amendment of the Commission's Rules with Regard to the 3650-3700 MHz Government Transfer Band, ET Docket 98-237 (rel. Oct. 24, 2000) (authorizing FSS earth stations on a secondary basis in primary terrestrial operations).

C. UWB Poses No Significant Threat Of Interference To Satellite Operations.

Lockheed Martin argues that the NTIA report raises questions regarding the potential for harmful interference from UWB transmissions into FSS earth stations in the 3650-4200 MHz band.[7] In fact, however, UWB communications present little or no risk to FSS earth station operations.

Even under NTIA's ultra-conservative analysis, the risk of harmful interference to satellite earth stations is predicted to occur only in highly unlikely scenarios involving earth stations operating at 5 degree elevation angles, particularly when the UWB communications system emitter is above 30 meters. As Fantasma noted in its comments, any UWB communications device found at 30 meters will most likely be in use within a building, where shielding will substantially increase its margin for compatibility. Furthermore, given the predominant use of C-band receive stations in the U.S. to receive video signals from satellites in the U.S. domestic geostationary satellite arc, a 5-degree elevation usage scenario would be extremely rare.

The Commission similarly can discount the comments of DARS operator Sirius, which suggest that UWB technologies are more prone to cause interference to radio systems employing digital modulation because of the high peak power of UWB emissions.[8] Sirius' systems are admittedly at risk in areas of low signal strength and of urban radio noise. This concern is one reason that Sirius is planning to deploy numerous ground-based transponders, even without any consideration of possible interference from UWB emitters.

The greatest shortcoming of Sirius' analysis, however, is the failure to take into account the FCC's proposed 20 dB peak-to-average power limit for UWB transmissions. Factoring this power limit into the NTIA's compatibility analysis

[7] Lockheed Martin Comments at 2-4.

shows substantially increased protection for other spectrum users such as Sirius and thus overstates the likelihood that peak UWB emissions are a cause for concern for users of digitally modulated radio systems.

D. There Is No Basis For Prohibiting UWB Above 2.0 GHz.

Several parties have suggested that the Commission establish a frequency "threshold" for UWB operations beginning anywhere from 3.1 GHz to 6.0 GHz.[9] These suggestions are based on unsubstantiated interference concerns. With respect to operations between 2.0 GHz and 3.1 GHz, Fantasma demonstrated in its comments on the Non-GPS Study that, once a peak-to-average power limit of 20 dB, indoor operations, realistic propagation models and other factors are taken into account, UWB communications devices will not pose a threat of harmful interference to radio systems operating between 2.0 GHz and 3.1 GHz.

As Fantasma and others have also shown, actual operating conditions will make it highly unlikely that government radar will suffer harmful interference from real-world UWB communications systems. Specifically, the NTIA Non-GPS Study makes various worst-case assumptions about antenna coupling between UWB devices and radar victim receivers and also about the locations of UWB devices with respect to victim receivers. The Non-GPS Study also does not account for radar processing factors that enhance the ability of radar systems to reject "undesirable" signals. By accounting for these factors, Fantasma has shown that the threat of harmful interference to radar receivers, including microwave landing systems, would be minimal.

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[8] Sirius Comments at 2-4.

[9] E.g., Sirius Comments; Comments of Rockwell Collins, Inc. ("Rockwell").

II. There Is No Reason To Delay Deployment Of UWB Communications Technologies On Non-GPS Frequencies.

Even in light of evidence that UWB communications applications above 2.0 GHz will not pose any credible or significant threat of harmful interference to other spectrum users, a few parties urged the Commission to delay deployment of all UWB-based technologies. ARINC, for example, claims that the NTIA test results demonstrate the need to understand the interference potential of UWB better before the FCC takes action in this proceeding.[10] AT&T Wireless similarly argues that the Commission should "refrain from adopting rules for UWB devices or permitting their more widespread deployment until more is known about the harm this technology could cause to existing services."[11]

There is no reason for the FCC to couple consideration of NTIA's Non-GPS Study with analysis of the NTIA GPS Study and, thereby delay the rapid deployment of new UWB communications technologies that present no realistic risk of interference to other spectrum users.[12] The GPS Study will undoubtedly trigger time-consuming controversy in this proceeding. The question of whether UWB technologies can coexist with GPS systems is a separate and therefore separable question.

The NTIA Non-GPS Study itself does not support delay in authorizing UWB communications technologies and the concerns raised in the comments on that Study either are overstated or readily addressed. The Commission should not, therefore, prolong the non-GPS portion of this proceeding, order additional non-GPS testing, or take other steps that would slow the introduction and deployment of this important new communications technology.

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[10] ARINC Comments at 3-4.

[11] AT&T Wireless Comments at 1.

[12] See Assessment of Compatibility between Ultrawideband (UWB) Systems and Global Positioning System (GPS) Receivers**,** released March 9, 2001 ("NTIA GPS Study").

CONCLUSION

There remains no evidence that UWB technologies operating above 2.0 GHz will pose any significant threat to other systems. The Commission should therefore promptly authorize UWB communications operations above 2.0 GHz.

Respectfully submitted,

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